

The anthropology of light in traditional housing, Comparative analysis of three case studies: Medinal Casbah, Japanese Machiya, Danish Aarhus

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**L'anthropologie de la lumière dans l'habitat traditionnel, Analyse comparative de
trois cas d'étude : médinal Casbah, japonais Machiya, danois Aarhus**

Abstract

Light is a concept rooted in the different fields of scientific, literary and artistic research; the cultural heritage of distinct societies has attributed to the notion of light a sacred guess value which holds its symbolic meanings peculiar to the societal identity profile; the built framework is the concrete translation of a language from which several architects have taken the light as a crucial material of designs, we have looked at the traditional habitat of which we will analyze the interaction of light with the habitat of three entities: medinal, Japanese and Danish. The analysis aims to shed light on the issue of luminous specificity and the socio-cultural foundations underlying this specificity. The comparative reading of three case studies will contribute to the understanding of this interaction and the identification of socio-cultural milestones.

Keywords

Light, built environment, culture, light atmosphere, traditional habitat

Résumé

La lumière est une notion enracinée dans les différents champs de la recherche scientifique, littéraire et artistique ; l'héritage culturel des sociétés distinctes a attribué à la notion de lumière une valeur divine sacrée qui tient ses significations symboliques propres au profil identitaire sociétal; le cadre bâti est la traduction concrète d'un langage dont plusieurs architectes ont pris la lumière comme un matériau crucial de conceptions, on a penché sur l'habitat traditionnel

dont on en va analyser l'interaction de la lumière avec l'habitat de trois entités : médinale, japonaise et danoise. L'analyse vise à mettre la lumière sur la question de spécificité lumineuse et les fondements socio-culturels sous-tendant cette spécificité, la lecture comparative de trois cas d'étude va contribuer à la compréhension de cette interaction et l'identification des jalons d'ordre socio-culturels.

Mots clefs

Lumière, cadre bâti, culture, ambiance lumineuse, habitat traditionnel

Introduction:

Light is omnipresent in our Earth's life, this spectacular meteorological phenomenon (Isaac Newton, 1666), a beam of electromagnetic radiation (D. McGloin and K. Dholakia, 2005) that propagate in a rectilinear manner, putting life on the Earth's surface, a perpetual source of energy from all kinds of creatures on Earth, from photosynthesis that produces biomass from the solar spectra, to the day/night cycle and the rhythm of successive seasons; this mysterious polychromatic element is the subject of a persistent debate between scientists of different centuries, from Descartes (1637) to Lamb, light can resemble a classical wave (Maxwell, 1865), a classical particle, both at the same time (Broglie, 1927) Or anything you know. Focusing on cultural life, light had played a primordial role in different cultures and religions; According to the Greeks, sunlight is an imitation of that of the spirit, true light is included in the being itself (Charles Mugler, 1960); Plato had interpreted light in his famous allegory of the cave as a symbol of knowledge, knowledge and truth in the visible world, so in his Chora presented in his Timaeus miscible in the light of knowledge and reason 'logos' (Jean-Francois Mattéi, 2003).

Through the light of Platonic thought, Saint Augustine laid down his concepts, the light of belief is a divine grace, the believing soul "faithful" is enlightened by the light of truth, he later called it "the inner master" The metaphysics of light has returned through Gadamer, who linked his concept of hermeneutic truth in his work "truth and methods", we consider truth as human manifestation, overwhelmed by the light of language emanating from it.

Islamic theology considers light as a symbol of purity, of clarity, one of the names of God who is himself the light of the heavens and the earth, descending from heaven, from high diviner, light allows us to cast away the darkness of darkness, it is both lunar and solar, a guide for all believing spirits, it reconciles, is thick and directs towards an emanation of the absolute, "light on light" an expression of revelation (Selim Khaznadar, 2000).

The Enlightenment (18th century) is a period in which the arts, literature and philosophy have developed, allowing people to share the world of knowledge and freedom (Yves Stalloni, 2015); two centuries before (16th century) Gorge De La Tour was one of the representatives of light as a crucial object around which the components of his artistic works are organized, the notion or the language of light/shadow is the key element that contrasts truth and darkness, creating its pictorial universe where spiritual light ignites and liberates itself in the darkness of night (Claude Petry, 1997).

In the art world of the contemporary era, several movements have explored the notion of light as the foundation of their work, citing the light and space movement that emerged around themes related to optical art in the 1960s.

The light sculpts the space, however the space is abstract without the penetration of the light, the presence of the body and the built matter is accentuated in the space by means of the existence of light source, Rodin added “a new sculpture in search of a modelling made by the play of lights and shadows”, the human and through his artistic and architectural projects tried to highlight his relationship to light, the Corbusier and through his work “vers en architecture”(1977) had classified light as a priority material for architectural designs, the diffusion and penetration of light by any type of opening in the built space determine the use of space itself, Louis Khan added in his work 'Silence and light, 1996' that “The window is a wonderful thing through which you get the touch of light that belongs to you, not to the sun.” The Glasgow School of Art has put a major emphasis on light in space, according to Steven Holl, 'Space is nothing without light'.

Space is considered as a category of the understanding of collective representations, products of social thought that accumulates multiple functions, economic, spatial, political, symbolic and imaginary; the consciousness of civilization materializes in their construction therefore the production of difference, Marx added in his 'German ideology', that culture is essentially conceived in relation to a concept of the production of goods and the exploration of resources, thus the raw nature.

Human behaviour in its space is determined by how it treats light, a symbol of worship that translates into the perception of light, Louis Khan said, "Without natural light, there is no life in space." Therefore, light being a human need, a reading on the history of light in the different civilizations is enough to know that light occupies a preponderant place between cultures and religions, man connects all the constituents of his culture in his own space, he projects himself with all his symbolic resources considering his identity, light is an integral part of the spatial language. The designer and occupier of the built space put not only the techniques and materials proper to his environment, but his mind and his own culture projected and marked by a system of symbolization, habitus, culture, Tylor defined the culture “this complex which includes knowledge, beliefs, art, morals, custom, and any capacity or habit acquired by man as a member of society” (Tylor, Edward B. 1958).

The anthropology of light in the framework built as a research theme remains a dark background that needs to be examined in more detail being an original, precise and coherent object of study given its primordial position attributed by the different civilizations.

If we can speak of a luminous specificity in the built environment, an analysis of three study cases strongly distinct by their cultural character, identity and notably architectural, will allow us to understand and justify the foundations that underpin this specificity.

I. Methodology :

This research work resulting from the elaboration of doctoral dissertation that is in the foreground in the light expressly the anthropology of light in the framework-built case of the medial world; This article will present one of the parts which is based on the documentary research which will later give the foundations of a comparative analysis of the three case

studies: Japanese (Asian), Danish (Western) and Medial. Based on the reviews and works that have treated the mentioned cases, as well as the descriptions in the form of texts, plans and photos taken even by authors (case of the medial world).

In order to confirm the presence of a luminous specificity of the adopted culture, and taken as a reference of the behaviors and mode of occupation of the space under the light, the reading and consultation of theoretical works are the crucial tool of this approach.

Following the work of Danielle Morali (1994), Jun'ichiro Tanizaki (1933), Francois Jullien and Zarytkiewicz, R. (2016), Bille, M. Sorensen (2007), it seems interesting to find the link between the different descriptions in order to draw the parameters that will make that the comparative analysis will follow the understanding and the discussion of the results by returning to the socio-cultural characteristics.

The built environment in particular the habitat represents the physical limits of all this planned reading and analysis, the notion of shadow, darkness, direct or indirect light, solar or lunar light will present the criteria used in this comparative reading, Rapoport described it: It is the ideal environment of a people that expresses itself in the constructions and in the habitat Popular tradition has much closer links with mass culture and daily life than the high architectural tradition that represents the culture of the elite" (Rapoport, 1972).

The traditional habitat will allow us to clearly identify the specificity in terms of architectural production, compliance with the culture and practices of space.

At the first level of reading, the built framework of our case studies will be taken as a global entity, indicating its shape, its architectural style and its relationship with its environment.

At the second level of reading, we will focus on the mode of appropriation and perception of light in the built environment, its mode of diffusion and its form of use, and the quality of space designed by their inhabitant/occupant in the light of spiritual conditions, cultural and symbolic.

We have made the choice to associate the various study cases with a clear distinction of their identities by pushing this research work to try to better understand the main study case of our doctoral thesis on the anthropology of light in the built environment of the «medial world».

II. Light and Lighting:

A. Lighting

Come from the verb 'enlighten' and that is according to Larousse react to the light, give a certain brightness, give warmth, cheerfulness, illuminate by making things lighter, more cheerful and less dark. One perceives a space especially its own purpose by the presence of lighting, according to Lyons (2013) it makes us able to know the physical limits of a room whose spatial quality relies mainly on the light conditions that characterize it. Several types of lighting can be distinguished depending on the source and mode of diffusion.

A. 1. Lighting/natural light

When it comes to the sun as the main source of this light, the openings, regardless of the windows, bays and doors or any type of holes that can allow the penetration of the sun's rays «sunlight» or to make the space illuminated by the light that moves according to the cycle day/night and the successive seasons of the year to say it otherwise "the course of the sun" the refractive law developed by Snell (1621).

The size, orientation and location of the openings are the determining factors of the light brought to the space. It should be noted that the light perceived at night, in other words 'moonlight', comes from the reflection of sunlight, so natural light is the result of the sun's nuclear combustion.

Even natural light has been highlighted according to several models, everything depends on the designer and designer of the architectural space, according to Louis Khan the space is defined by light 'to design space is to design light' (BrownleeDe Long 1991).

A. 2. Lighting/Artificial Light

During the ancient centuries, fire was the first source of artificial lighting, it was used as a nocturnal tool as well as to make a space that has no contact with the illuminated exterior; we also note the light reflected by the moon. The candles are later used and they have given rise to oil lamps which have made it possible to enjoy the light more slowly and less vacillating. Candles are used for spaces that have significant value, such as religious spaces, palaces, etc. In the 18th century, a series of innovations aimed at significantly improving artificial light, we can mention Lavoisier, Argand and the hollow wick lamp with a pipe. In 1879, Edison had marked the history of artificial lighting with the invention of the light bulb, which had changed the space conditions of the century.

A. 3. Light, mode of diffusion

Lighting or light is defined by its mode of diffusion and according to which their emitted form will be displayed and diffused in the built space. The mode of delivery is direct, indirect and transmitted light (Jia Feng TAN, 2021)

3. a. Direct

A direct light is called any light received by space with no intermediary in the absence of obstacles and reflection phenomenon.

Direct light without filtering is characterized by its intensity and its uniform diffusion that makes visible the space or the illuminated place.

3. b. Indirect

Unlike direct light, indirect light reaches the space by its reflection on another surface, so the source is not necessarily visible, we see that its reflection illuminates the space. The indirect light blocks and prevents glare, a harmonious, soft, homogeneous and attenuated light with less contrast by decreasing the shadows worn, the light being a lampshade. Smooth surfaces make it possible to reflect more strongly than structured surfaces.

3. c. Transmise

When the light is confronted with a translucent material, a quantity of this light will filter and prevent it from passing through the material, however a part of this light will pass through this material, resulting in a very soft and subdued light.

4. Light and Ambiance

Each space has a certain atmosphere, according to the fundamental parameters that control the space the physical limits, the depth and the light or lighting, the three factors that constitute the atmosphere of the space; by focusing on light as a variable factor, a single space can reveal several sensations, the same light quality has several meanings, example (Table 1) (Stefan Fraenkel, Ray F. Iunius, 2007)

Light in space	Sensation
Sunny	Warm space, joy
Poorly	lit Space gloomy, discreet
Shaded	Intermediate space, introspection
Screened	Serenity, tranquility

Table1. Sensations returned by light into space. Source: collected by authors.

The atmosphere of a space under the light represents one of the cultural figures specific to several civilizations and societies, each with their habitus and the different events they have gone through and want to pass and present, we quote what Tadao Ando said “Light gives drama to beauty”.

4. a. Shadow/Light

The relationship between shadow and light caused by the contrast of the projection of direct (or artificial) natural light prevented by an impenetrable element, as a result of this phenomenon we obtain by opposite the shadow, this light/shadow contrast gives a rather important sensory experience on the perception of space including the architectural space, the changes they undergo the shadow follow the course of the sun, these changes make the space more dynamic, and more dramatic, as described by Norman Foster Natural light is constantly evolving. This type of light can give characteristics to buildings. Under the action of space, light and shadow, we can create drama.”

La relation énigmatique de la lumière/ombre produit un espace mystérieux, riche en sensualité. Les matériaux translucides produisent de l’ombre d’une manière homogène et uniforme. L’ombre isole les yeux et les regards, le jeu de percement qui influence le confort, le sentiment attribué et le symbole qui permet de renforcer les liens socio-culturels dans l’espace bâti.

4. b. Darkness /clarity

The darkness is the result of the absence of light, the night is the main shelter of darkness, where we lose our notions of perceptions from which they shrink, the soft light will put back to space its configuration while accentuating on the darkness of space itself. The duality of darkness/clarity produces a rather striking effect of clarity, one shows the aesthetics of the space endowed by the serenity due to the light rays that cross the darkness of the space. In one of the rare cases where anthropologists speak of the social effects of light, Christine Helliwell (1996) writes that “when I fall ill, I had to stay in bed during fieldwork at the Dayak Longhouse.” She had no light in her room. Lack of light had influenced the well-being of human beings.

4. c. Transparency

Transparency is derived from the use of glass as a material in architectural designs with light, glass allows light to penetrate the space in an optimal way, Méredieu in the material and immaterial history of modern art, added about glass «he (the glass) tends to fade, assumes ghostly properties of the order of disappearance or appears as a heavy block wall, volume, on which the look collides».

In contrast to darkness, transparency offers a maximum relationship with the landscape and the outside environment, the transparent structure opens completely on the outside, no limit that prevents visual continuity between the outside and the inside, The glass houses Ludwig Mies Van der Rohe and Philip Johnson. A paradoxical sensation caused by being physically protected but visibly projected.

II. the case studies

A. Presenting the case studies

The choice of our study cases followed a precise logic, we preferred to highlight the traditional habitat of three entities widely distinguished, not only by their heterogeneous continental positioning, but rather by their dissimilar identity stamp, according to Rapoport (1972) The human environment, especially the built environment, has never been and still is not controlled by the architect. This environment is the result of an indigenous (or folkloric or popular) architecture”; the main actor is presented by the “designer inhabitant” or “actor inhabitant”, a figure sketched by Patrick Geddes, was the result of one of the first collaborations of architecture with the humanities, Patrick had used the approach of field investigation in the work of urbanism and architecture, the habitat therefore is the subject of several reflections of archi-typeanthropological, both by its distributive organization and by its constructive techniques; taking Bourdieu’s article on the House of Kabyle, a reading of constructive techniques and the social organization of space, practical and symbolic, he analyzed this society according to an academic framework.

A. 1. Medial habitat

The word ‘Medina’ has its origin in the Arabic المدينة’, which refers to the city, according to UNESCO (1995), the median is “social unit of reference, exclusive habitat for consolidating sedentarism. Space permeable to surrounding rural nuclei Within its walls germinates a living social fabric with its passions of love and war capable of building, over the course of history, its own signs of identity and the translation of lifestyles through literary and artistic creation, as well as by architectural and artisanal expression», this appellation was attributed to the historic cities located in the Maghreb, the North-West African; The medina is the historical center of the city which has a part in opposite part made part of colonial European style, this term “Medina” is the significant expression of the city, Ibn Khaldun had mentioned this term gifts his famous “INTRODUCTION” during the 14th century, the medina refers to civilization on the scale of the city. In short, they are contemporary tourist imaginations imbued with colonial representations of the Other and the Elsewhere (Staszak, 2008).

In Algeria, the medina houses a crucial place in the urban planning of cities that have historical value, in the Middle Ages and during the Islamic reign, the medinas were built to meet the needs of their inhabitants (Marc Cote, 1999). The Kasbah of Algiers is one of the medinas classified by UNESCO as world heritage, the first core around which the capital was built, it imprints a succession of several occupiers, the Phoenicians (4th century BC), the Romans (2nd century), the zirides (10th century) the Ottomans (16th century) and the French (19th century).

The patio, the introvert on the outside, the terraces, the morphology of the ground, the sky, the sea and the organic organization, these principles characterising the original character of which it refers to the coherence and harmony of each architectural element with the cultural tradition (André Ravereau, 1989), together make this medina a subject of study for several researchers (Mostéfa Lacheraf, 2013).

A. 2. Asian Japanese habitat, Minka

The People's House, the Minka or the traditional Japanese habitat, these terms refer to a single meaning, the Minkas were classified into two large entities, the 'Nokas' or the farms and houses of the 'Machiya' villages.

The machiyas represents the center of traditional houses in the city, its history takes its roots from the Heian era (794-1185), it was in perpetual change until the Edo era (1603-1868) where the machiya habitat had identified its architectural space.

Kyoto represents the capital of the machiyas, in fact they have taken the 'Kyo' as the initiative of the word machiya and become 'Kyomachiya', an architectural style that manifests by houses in strips (in length) endowed with a narrow facade that overlooks the street.

However, a large part of the machiyas was rebuilt at the arrival of the 20th century, the vulnerability of some inhabitants and the fires suffered by its weakened tissues were the main factors of this reconstruction work. Machiya can be roughly divided into three types. The first was designed as a large boutique with a commercial space at the front and a back living space, the second type was purely residential. The third type has a work room behind the building and was designed for the weaving and textile industry.

In the morphological architectural plan, La machiya is generally characterized by a wooden structure, a spatial organization planned in depth with a garden in the heart of the habitat, the machiyas have a close relationship with the culture from which they have taken their principles, an architectural stamp that respects the needs and the status of its occupants, an expression of cultural and social background that shows a whole modelling derived from the relationship between architecture and mind-body according to a very striking Japanese philosophy (Hoarau, 2010).

A. 3. Danish Western Habitat

The traditional Danish habitat dates back to the era of Vikings (late 8th - late 11th century) marked by the construction of military camps potentially by King Harald Bluetooth, circular ramparts have left their traces according to the operations of archaeological excavations, it bears witness to the succession of several epochs, Roman, Gothic, Renaissance and Baroque. The half-timbered house is the result of a slow transition, at the end of the Middle Ages, initiated by traditional houses in towns and villages.

The Old Town of Aarhus, Jutland, is considered an open-air museum consisting of 75 historic buildings collected in all regions of the country. They include a variety of half-timbered houses, some dating from the mid-16th century.

These habitats are the result of a fusion of social, cultural and environmental language, they represent the superposition of several periods, the main factor that led to the final form of these built structures.

B. Light/Habitat Interaction Analysis

The interaction of light/built environment by specifying the habitat as a case study, is the main subject of this analysis, we seek the perception of light in the habitat, its representation through rooms and openings, how light penetrates the inhabited space, by what method and technique is it treated, how the inhabitants of these constructions want to interact with the presence of light.

B.1. The medial habitat- Casbah of Algiers

B.1. a. spatial organization



Figure1. Casbah of Algiers.

Source : taken by authors on April 6, 2021.

The Algiers casbah is identified by its introverted plan on the centre of the 'patio' (C) house, of which it represents the main source of light, beginning with 'Skifa' (B), which is the transition space between the outside and the inside, a dark space with a small surface preserves the intimacy of the house (interior) 'Byoute' (I G F) living rooms are organized around a gallery that opens directly onto the patio, the staircase leads to the upper floor, a set of 'Byoute' houses (L K) kitchen (J) and loggia 'Maakad' (M), overlooking a covered gallery (D) with views of the patio (C).

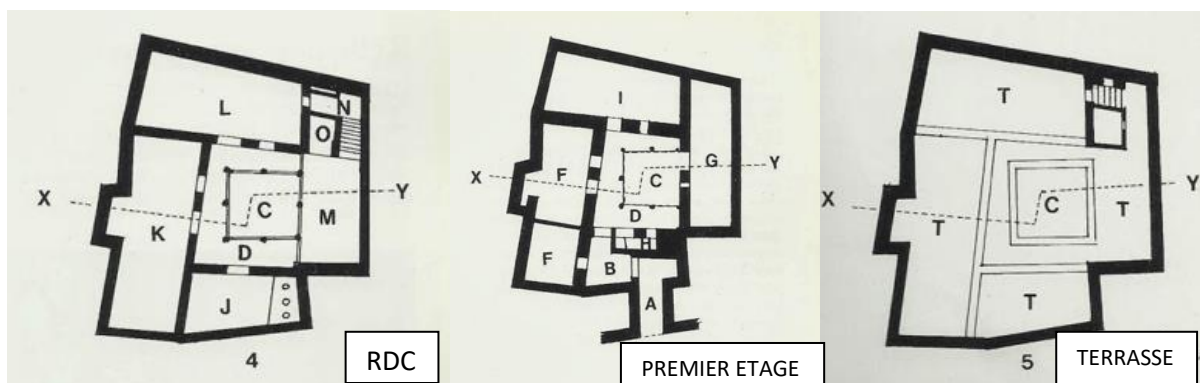


Figure2. Ground floor plan, first floor and terrace casbah of Algiers. Source: the casbah the site created the city Andrea Ravereau.pp77.

The 'Stah' or the terrace (T) is an open space, open and overlooking the bay, it occupies all the space of the house except the hollow of the patio. In summer, it is the night space par excellence: enjoying the fresh air, its white colour comes from the plaster, the light of which

bursts in it, the friendly space with female domination in the open sky, the communication and information transformation centre, space where women and children can be with their neighbors without leaving the house: we roll the couscous, dry the meat, hear the line, while chatting about the last points of the city. The interior space of the habitat is considered as the space of female priority, so intimacy is one of the main foundations on which the habitat was built.

B.1.b. Space, light and atmosphere:

the patio

the skylight or home takes its daily dose of lighting and aeration.



Figure 3. Open-air patio view. Source: taken by authors on April 6, 2021

A versatile, transparent place where the various events take place (festivals, family gatherings, visits, weddings..etc.); community life at the patio is characterized by dialogue, the physical activity, the leisure which it is ready at any time to gather people, therefore it is a clean and well-lit place, richly decorated by the arcades, the carved columns, the tiles of earthenware, a floor covering(pavement), often there is a fountain in the centre of the patio, a source of water for cleaning work, and an ablutions fountain.

Light, the versatile space decorated and surrounded by arcades, and water are the three elements that determine the patio in most habitats. All the rooms of houses overlook the patio, they take the majority of their need for light through the openings (Windows and doors thought open) facing the patio.

the Skifa

It is the reception area that preserves the intimacy of the house, a dark area raised above the street level (so as not to leave the penetration of the waters) Fitted out in the case of large mansions in Driba; Space that filters people before accessing the patio.



Figure4. From the Skifa to the patio.

Source: taken by authors on April 6, 2021

The penetration of the gazes towards West el dar ‘the patio’ is controlled thanks to this space, its luminous quality including the light/shadow contrast will protect the interior of the house from the gaze of strangers, so it is like a waiting room or a vestibule, you take some time before you find yourself in the patio, this vestibule has a luminous quality to measure its function, entering a dark space less illuminated than the outer space will allow us to feel that it is a space of transition, a dark articulation between two lit spaces, the contrast marks the hierarchy of intimacy: public, semi-public and private.

The apertures :

Windows

The windows are usually marked at the level of the living rooms overlooking the patio, windows that have a largely acceptable size illuminate the room inside, the room is lengthened in length allowing the light to penetrate the whole room



Figure5. View of the patio. Source: taken and processed by authors on April 6, 2021

The depth of the windows can serve as a place to sit, one takes advantage of the glances towards the patio whose microclimate attracts the attention of those who are seated.

We can distinguish windows that open towards the outside of the house, it is characterized by its small number, their small size, of which they occupy the upper part of the wall in depth.



Figure6. Windows overlooking the exterior of the habitat. Source: taken by authors on April 6, 2021

The staircase benefited from its share of light, holes at the threshold of the staircase entrance lead the patio light to the depth of the staircase



Figure7. The small openings that illuminate the staircase and even the living rooms. Overlooking the patio of the habitat. Source: taken by authors on April 6, 2021

Through its different types of openings, the inhabitants of the medina, especially of the housing, have controlled the degree and the mode of lighting of the various interior rooms, dark lighting led by small openings or holes until good lighting is obtained by large openings that feed the space inside, small openings that overlook the exterior are marked at the level of facades while keeping the intimate aspect of the habitat.

Doors

Door Thought to be open

These are the doors of the living rooms, they are characterized by their dimensions and their richly carved carpentry that offer a multitude of choices of opening and closing of the doors. The opening of the doors is done towards the exterior of the rooms, this gesture emphasizing the functional specificity of the medina, the door can be closed and open completely, or close the doors and open the integral doors in these very doors, keep half open and half closed ... etc a multitude of choices that suits the needs of the inhabitants during the different seasons. So these multiple choices offer a multitude of light parameters.



Figure8. The door thought to be open. Source: taken by authors on April 6, 2021

André Ravéreau (1989) had well expressed this notion peculiar to medinal architecture, all the first and second level doors and the gallery are made appropriately and proportionate to the complementarity of these elements that had shaped this unique architecture.

Door Thought to be closed

Are the entrance doors to the habitat, the carpentry of these doors is generally characterized by two parts, a fixed part and a mobile part. Responding to different perspectives on the need for defence. It's a door to the street that opens inward.



Figure9. Door Thought to be closed: <https://maison-monde.com/portes-de-casbah-dalger/>

This door can lock in an emergency. The adjoining space, kiffa, organizes the transition enter the street and the patio offering the possibility to keep the doors open in warm weather by slightly lighting the Skifa. These doors can reflect, through the decoration and the quality of the wood, the value of the habitat inside, whether it is a large or a small residence.

B.2. Japanese habitat

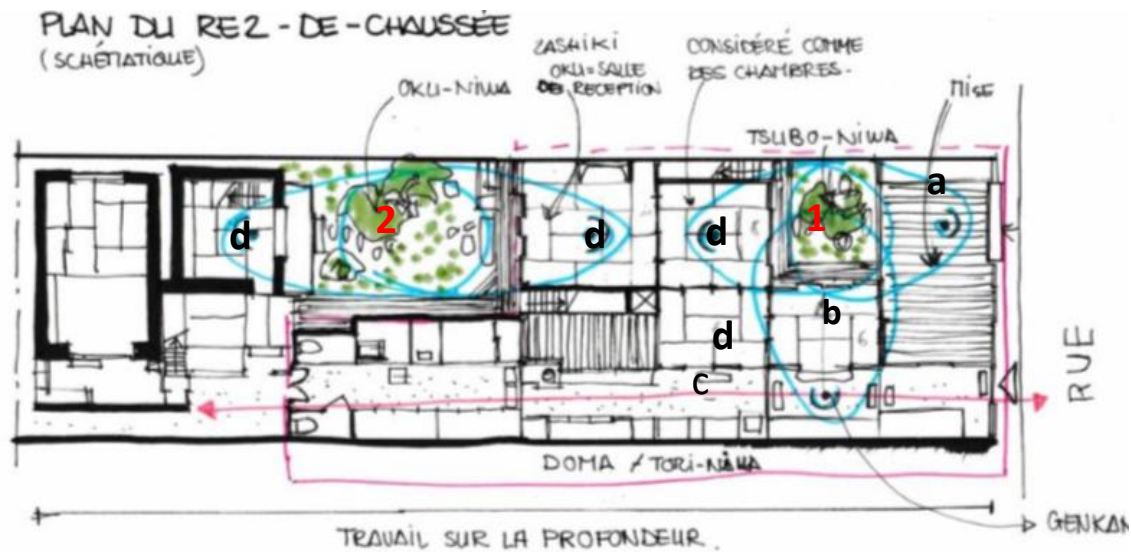
B.2.a. spatial organization

The machiya occupies a rectangular space with a garden in the middle 'oku-niwa (1)' and 'tsubo-niwa' (2); As the cover of the machiya, the rounded tile roof 'mukuri-yane' is the important element of weatherproofing, rainfall and wind resistance.

The machiya has 5-6 elongated rooms and arranged in an adjacent way towards the interior of the house while a room with a facade that overlooks the street is used as a shop

Machiya is organized on several platforms or strata, which reflect a hierarchical system of intimacy.

Figure10.ground Plan of a machiya. Source: BERTHE-BONDET Isabelle, 20 Japanese



houses- an art of living in small spaces, Marseille, Edition Parenthèses, 2010, treated by authors.

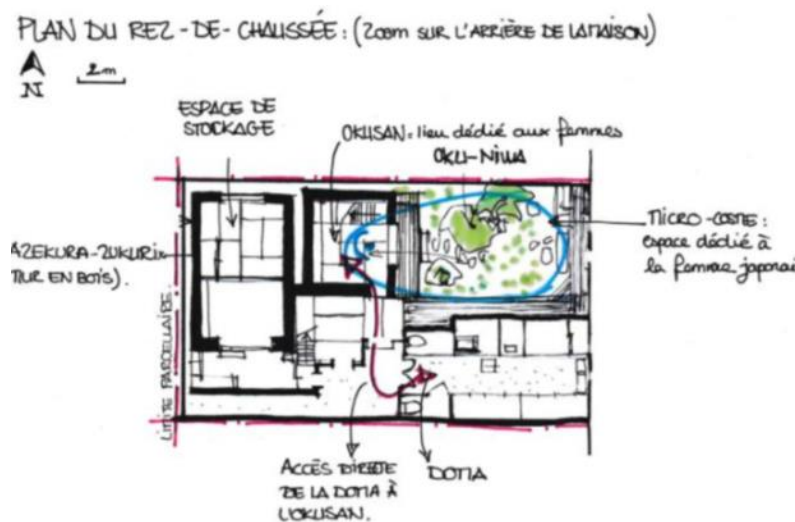
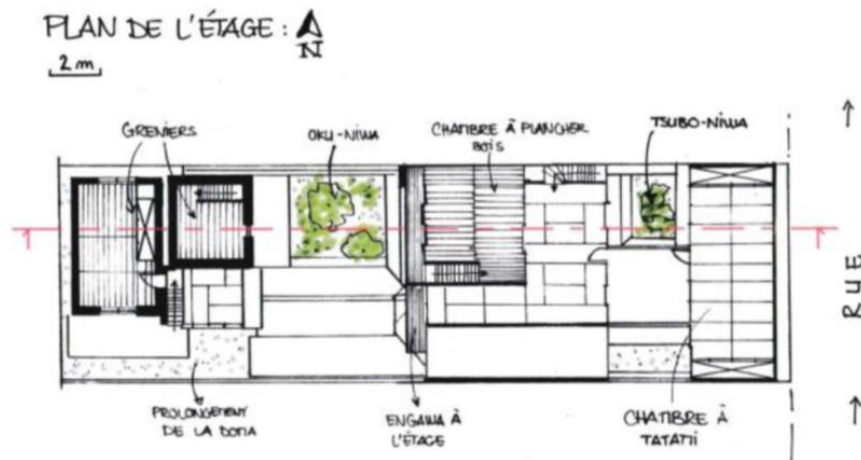


Figure11. Zoom in on the back of the house. Source: BERTHE-BONDET Isabelle, 20 Japanese houses- an art of living in small spaces, Marseille, Edition Parenthèses, 2010

The machiya can be divided into four major entities: (a) the 'mise' or the room that overlooks the street and has a commercial purpose, (b) the entrance, (c) the courtyard 'doma', the kitchen and the bedrooms.

The genkan is on the same level of the street, the commercial place is a little higher than the genkan, the living space is above the commercial space, therefore the change of stratum depend of degree of intimacy; the genkan plays the role of a vestibule whose ground is used as a passage, the setting, the tsubo niwa (garden) form a kind of visual barrier between the public space of the house and the intimate space (private).

The rooms communicate with each other through the shoji, paper sliding doors. The plot bottom is the female space with storage space. The stairs are in pedestals and arranged in



cupboards to reinforce security against threats.

Figure12. floor plan of a machiya. Source: BERTHE-BONDET Isabelle, 20 Japanese houses- an art of living in small spaces, Marseille, Edition Parenthèses, 2010.

On the level of the floor, we find the rooms to tatami above the bed and the living space of ground floor, for the bottom of plot we find the attics.

B.2.b. Space, light and atmosphere

‘Oku-niwa’ ‘tsubo-niwa’ Gardens

The garden is the strong element in the machiyas, it is the only space with direct lighting of the sky, it represents the natural world. It is at the lowest stratum level, with natural soil (pebbles, stones, water and plants spreading out towards the open sky, all these details form rather special morphological structures, one manages to feel nature by projecting the shade in the corners.



Figure13. View of the tsubo-niwa machiya garden.

Source : https://www.govonline.go.jp/eng/publicity/book/hlj/html/202105/202105_06_en.html

The small 'tsubo-niwa' garden is the means by which we feel the succession of seasons, a well of light that brings back to the rooms surrounded by natural light, this place is a source of light, nature and life, it is exploitable by the views and looks it provides.

This garden is surrounded by the setting (commercial place), the genkan and a tatami room, it is the articulation and transition from a public and turbulent outdoor space to an intimate and quiet indoor space, this garden with the 'genkan' vestibule form a kind of sensory and visual isolation. The light of this part of the machiya accentuates the depth of the habitat, the light/shadow contrast attract the attention of the visitors.

The 'sudaré' is a horizontal bamboo slat, a awning that surrounds the upper part of the garden, to cool the warm summer environment. It also prevents dust and absorbs moisture on rainy days.

The oku-niwa is the Japanese garden at the bottom of the plot, it is dedicated to women, given its spatial-luminous qualities; it is larger than the tsubo-niwa and more intimate, a meditation space caused by the microcosm controlled by the direct light caught up by the garden, the plants and its position at the bottom of the plot.

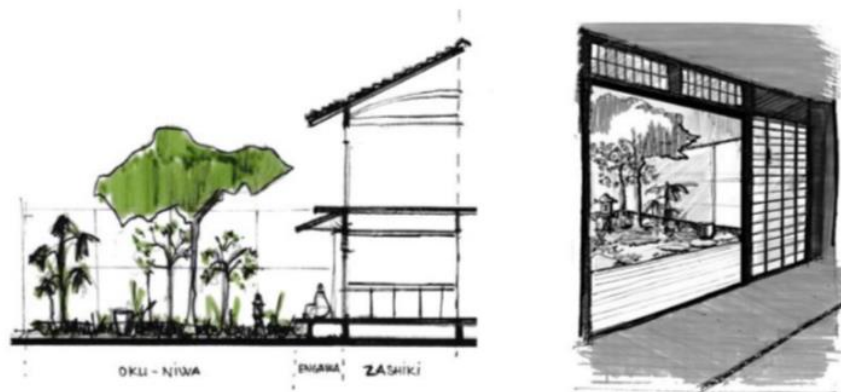


Figure14. Schematic section of the reception hall, the engowa and the oku-niwa garden. Source: BERTHE-BONDET Isabelle, 20 Japanese houses- an art of living in small spaces, Marseille, Edition Parenthèses, 2010.(document produced by Alice Hoarau)

The shoji

Is a crucial device in the separation of interior parts, it is produced by wood lattice and paper (rice), a translucent material that makes that the machiya or Japanese habitat in general takes its specificity in terms of penetrated light.

The shoji is a removable sliding wall that controls the mode of opening and degree of separation of the rooms, it should be noted that the living rooms (to tatami) are characterized by their fluidity of arrangement and connection between the different spaces.



Figure15. shoji, the Japanese window door rooms.

Source : <https://www.flickr.com/photos/ogawasan/49710234596/in/photostream/>



Figure16. shoji, removable partition between rooms.

Source : <https://traditionalkyoto.com/architecture/shoji-screens/>

the window and the Sudare

In the machiya one can distinguish a single 'mado' window, it is usually covered by sudare making a contrast between the clear sudare and the dark Bengara-goshi. Bengara-goshi is formed by a lattice in order to keep away the outer wall dogs, a traditional Japanese lower fence, usually made of quarter-oval bamboo, is used on rainy days, it is also intended to take a look outward. It is a form specially designed to prevent fires, however it did not work as expected, but it was as well ventilated as the sun in the house.



Figure17. Bengara-goshi in the façade

Source : <https://harikopaper.com/blogs/blog/yokono-washi-ueda-tsuyama-papier-japonais-mitsumata-bengara>



Figure18. the Sudare and the contrast with le Bengara-goshi. Source : <https://harikopaper.com/blogs>

Bamboo blinds are displayed in front of the second-floor windows to refresh the warm summer environment.

It reduces dust and absorbs moisture when it rains.

The harmony found in the machiya districts symbolizes the fashion that dates back centuries and tells a story of long resistance.

The play of shadow and transparency are the foundations of the layout and the spatial organization, the light/shadow contrast marks the depth of the house, a visual expression of the space causes sensations related to the body, space and light.

Shoji can generate a moderate and filtered brightness it eliminates solar rays.

Japanese architect Hiroaki Otani added, I try to exploit the relationships between full and empty to go from dark to light. It is for me in this relationship that Japanese beauty is found».

B.3. Danish habitat

B.3. a. spatial organization

traditional Danish housing is distinguished by its half-timbered style, rectangular houses usually are on the ground floor or R+1, a massive and sloping tile roof with a solid brick chimney exit. We analyzed a house from 1864.



Figure19. traditional habitat in Aarhus
.Source: [www. Travel-pictures-gallery.com](http://www.Travel-pictures-gallery.com)
and visitor descriptions

Figure20. schematic plan of a Danish habitat
Aarhus Source : authors, plan based on videos

The entry of the habitat is done by a striking door that overlooks a small hall of square shape, in front of the door there is usually a ladder that leads to the attic below.



Figure21. traditional habitats in Aarhus view at work the entrance hall. Source: Aarhus, Denmark- a walk through the old city-video youtube-. Captured and processed by authors.
The bedroom to the right of the entrance serves as a workshop or bedroom or both at the same time.

On the left is the living area, the large room of the house where it occupies all the depth, a fireplace in the center of the side wall illuminates and heats the room at the same time especially

during the winter season, in Scandinavian countries the winter season is longer than other seasons.

Figure22.traditional habitat in Aarhus . **Figure23.** Danish woman knits with her husband



Source :www.Travel-pictures-gallery.com



traditional habitat in Aarhus living room,

source :www.youtube.com/watch?v=DoyuDHwGtRA.

Access to the kitchen through the living room, through a shared space between the oven, toilet and kitchen. The living space is shared between man and woman, the man works in his shelter in particular in the independent room that is right in front of the entrance, the woman occupies the kitchen and living room to accomplish her daily tasks.

The attic is used as a storage space. The traditional Danish habitat is characterized by the polyfunctional space, a simple development will contribute to the space a specific function that adapts to the new layout.

B.3.b. Space, light and atmosphere

The apertures

All the houses of Aarhus contain openings: the entrance door and the windows appear in the main facade.



Source :

The entrance door is located in the middle of the arrangement of the two windows of which they take the dimensions according to the value of the frame. The light interacts with the interior frame through the windows arranged throughout the facades.

The reading of the facades allowed us to recognize the rooms inside, each window illuminates the surrounding area beyond the wall.

As a result, desks, embroidery tables and even kitchen countertops all promote and occupy the space near the window.



Figure25. A writing table in front of the window Traditional habitat in Aarhus. Source :

<https://www.youtube.com/watch?v=DoyuDHwGtRA>



Figure26. A woman knits in front of the window in Aarhus Source : Hilke Maunde



Figure27. The lighted table and the dark bottom make a contrast Source : <https://www.flickr.com/photos/olemsteffensen/26563170499/in/photostream/>

This analysis had shown that the space benefiting from light of the windows is in most cases the preferred space to do the various tasks that requires good lighting



Figure28. traditional habitats in Aarhus shade worn on the windows . Source :[www. Travel-pictures-gallery.com](http://www.Travel-pictures-gallery.com)

The space occupied around the window is the friendly space of the house during the day, the chimney takes the place of window being a light source during the night. The roof pulls its ends by covering the windows of the lower floor, the unhooking causes shade at the facade. The Danes illuminate the worktop, the reading desk, the dining table, they leave the shadow propagated in the corners and corners of the rooms, a contrast that highlights the lighted places.

Around the lighted space are organized the activities of the inhabitants, one finds the space below the window arranged by tables, chair, desk, weaving apparatus... etc

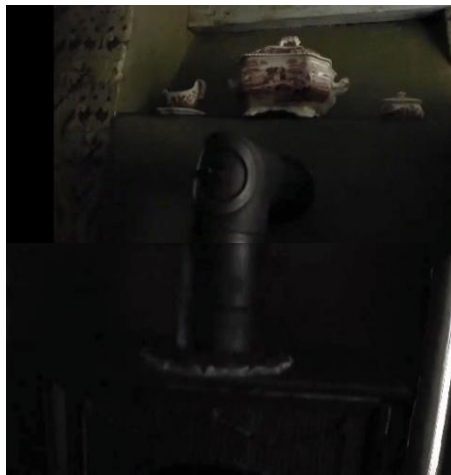


Figure29. Une cheminée dans le séjour habitats traditionnels à Aarhus

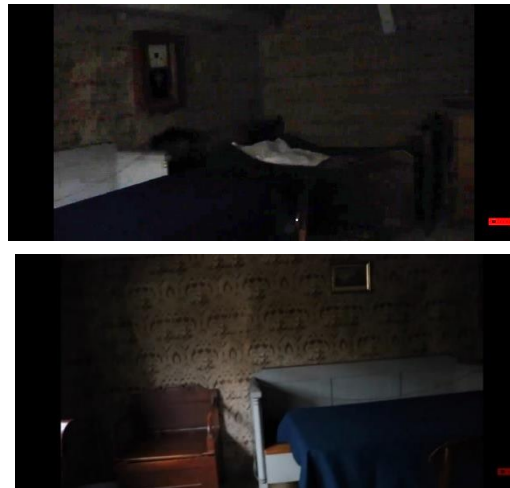


Figure30. Vue sur le séjour habitats traditionnels à Aarhus

Source : <https://www.youtube.com/watch?v=DoyuDHwGtRA> capturées par auteurs.

III. . The anthropology of light in the built environment, traditional habitat

Specificity, if we can sum it up, results from the intersection of three major entities: society, nature and culture. They make the space in particular the built environment suitable for a culture in a particular natural environment; the peculiarity of built environment is born of a process of superposition during an important period and the protection of any kind of deterritorialisation, therefore the vernacular habitat presents the preferred alternative to study the purified space, Amos Rapoport said “we are not only interested in buildings, we are also interested in behaviour in buildings and cultural landscapes, and anthropologists have things about these issues....] I am interested & any environment, as a way to address certain issues in research environment-behavior. In fact, for me it's a way to get into the environment-behavior domain. Vernacular environments provide a much easier access to this area» (Arch. 8 Comport. 1 Arch. 8 Behav 1992), the resident designer of his physical space put not only the techniques and materials proper to his environment, but its spirit and its own culture projected and marked by a system of symbols.

The vision of light and lighting is the main subject of several philosophies, a notion very marked in the social and cultural expression, the analysis made previously revealed the interaction of light as «a matter of architectural construction» (Paolo Portoghesi, 1995) with the 'habitat' built environment.

A. Medinal habitat exemple Casbah of Algiers :

The analysis of the medial habitat has shown us the architectural response to the needs of the inhabitants; the introvert on the interior is one of the crucial concepts according to which the medial architecture was founded.

Islamic philosophy had given light a particular intention, it is a figurative element of the manifestation of clairvoyance, perception and the absolute sees (Flamky, 2004), “light on light” that God will illuminate the sky and the earth, the God is the light of the heavens and lands’ several suras(verses) of the Qur’an evoked the relationship of light with the religious spirit, citing the description of faith as a light that shines through a glass lamp that reflects a unique brilliance (pablo Portoghesi, 1995)-(Richard Zarytkiewicz, 2016).

Allah the Almighty is the most complete example of light (Tabatabai, MH.2009). He guides the spirits to the right path by emerging his creatures in his own light. Yet light is the sacred symbol of purity, reason and serenity.

In the medial habitat, the existence of light is primordial for Islamic culture, the contrast between light and shadow is established by the transition from the dark space, from the ‘Skifa’ darkness to the open ‘patio’ sky light.



Figure32. First stage solar radiation diffusion.

Source : prises et traitées par auteurs
le 6 avril 2021

Source : skyscraperCity Forum.

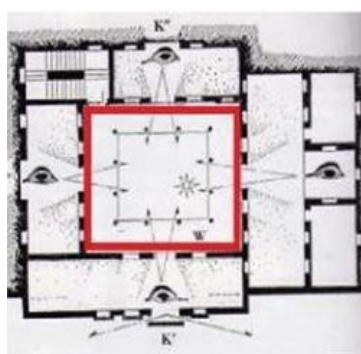


Figure33. Skifa transition space.

Source : wikimedia Fondation.

Figure34. Schematic plan showing the views towards west-eddar ‘patio’ made from the four pieces. Source :

Ravereau, André. La Casbah d’Alger, et le site créa la ville.

Privacy is preserved by this transition and contrast light/shadow, skifa/patio.

We enter the habitat through the closed thought door being the limit that separates the two opposite worlds, we find ourselves in the Skifa, the dark quiet space that will let us think of what we will find after this space.

Crossing the Skifa, we feel the effect of this luminous change until arriving at the patio 'West-eddar' a space bathed in direct light, this light plays the role of a connection heaven/earth, the good God that surrounds us, Andre Raverau had shown the orientation of the looks of different rooms towards the patio.

We keep this connection possible through the four directions, the window also has a depth used as a seat from which we can sit.

Speaking of light/shadow contrast, the Muslims have developed a rather specific technique that allows to inject windows that look on the outside but while keeping the privacy of the space. The Moucharabiya is wood carved in a very refined way and adorns the medial façades, often it is found in large houses, it offers the possibility to have views on the outside of the habitat (especially for women).



Figure35. Moucharabiya Algiers. Source : Mare Nostrum-Overblog.

The Moucharabiya is an adequate response to climatic needs too, in arid climates the light is very intense therefore in order to create a friendly and airy microclimate, the geometry of the holes accelerates the natural ventilation as it leaves some rays penetrate the space, a device that brings back light in a controlled way, a specific atmosphere manifests itself by this architectural solution.

This contrast accentuates the sacred relationship of light and the medial built frame.

B. Japanese habitat example Machiya Kyoto

Among the Japanese, sensory philosophy is intimately linked to Japanese architecture, cultural and social values have marked the soul of this type of habitat.

Wabi-Sabi is a philosophy of Japanese beauty descended from Buddhism, it combines three fundamental elements: body or physical expression, mind and nature (Leonard Koren, 1994), The sensory expression of this philosophy comes from four notions: light, emptiness, ambience and kinesthesia of which it denotes the movements of the human body caused by internal sensations.

Light being a milestone of this philosophy, it has exalted the psychosensory relationship of Japanese architecture especially in the example of machiya.



Figure36. 'oku-niwa' machiya garden. Source : <https://www.alamyimages.fr/photo-image-jardin-tsuboniwa-en-bambou-machiya-house-kyoto-japon-14140482.html>

The 'Oku-niwa' 'tsubo-niwa' indoor gardens are the only sources of natural light in the whole house, the machiya is organized along an axis with a single facade that overlooks the street, no windows can be integrated (with the exception of the main facade).

The light caught up by these gardens will be diffused by the Shoji, the key element of Japanese light matter.



Figure37. View of the garden from inside machiya. Source : <https://www.alamyimages.fr/photo-image-jardin-tsuboniwa-en-bambou-machiya-house-kyoto-japon-14140482.html>

The machiya roof structure bathes the interior space, and even the 'engawa' exterior passageway in the shade, the roof dominates the entire habitat, as the gardens are open-air forming a microcosm of meditation and imagination.

The beauty of light is expressed in the presence of shadow, this philosophical concept was evoked by the Japanese Junichiro Tanizaki through his work "Praise of the Shadow" (1933), the clear/dark duality is correlated with the concept of sensation and imagination, established before, the shadow sculpts the space, it highlights the depth of the machiya, it aims to provoke in the visitor's mind this feeling of curiosity to know what we will find at the bottom of this filtered light, a sacred path towards the light. For a lacquer decorated with gold powder is not made to be embraced with a single glance in an illuminated place, but to be guessed in an

obscure place, in a diffuse glow which, at times, reveals one or the other detail, so that, most of its sumptuous decoration is constantly hidden in the shadows” (Junichiro Tanizaki, 1933).



Figure38. Shoji filtered light

Source : <https://www.johnbarrarchitect.com/post/2017/10/26/light-and-transparency-in-japanese-architecture-in-praise-of-fuzziness>



Figure39. Clarity darkness.

Source : <https://www.flickr.com/photos/barbery/5620396447/in/photostream>



Figure40. Praise of the Shadow.
source: Matthieu Zellweger.



Figure41. Shoji and contrast shadow light
Source : <https://photohito.com/photo/1894338/>

The fluidity of the living space promotes the diffusion of filtered light, the emptiness served as a background of imagination and sensation, the atmosphere created by these devices symbolizes a whole philosophy, including culture and religion.

C. Western Danish habitat example habitat in Aarhus:

The vision of light among the Danish inhabitants is completely different from the previous examples, the notion of ‘Hygge’ refers to comfort, the intimate state results from being surrounded by friends and family is the hospitality sought (Borish, 1991). The layout of the living space is influenced by the ‘Hygee’, with the aim of creating an appropriate atmosphere, particularly in terms of subdued lighting.

In order to reach the Hygee, the light and its intensity, it should be sufficient for the members of the social group to see and make eye contact with each other without completely illuminating the room (Bille and Sørensen, 2007).



Figure42. Danish woman knits with her husband-living room in Aarhus - chambre Source

<https://www.youtube.com/watch?v=DoyuDHwGtRA>



Figure43.traditional habitat

So, we aim to create an intimate place endowed by some light sources and the movement of shadow distributed in space.

The windows are controlled using curtains to attenuate the light that penetrates the space.

In order to accentuate the 'Hygge' the interior walls are covered with dark tints.

'The living light' is the Danish description of candles. The Danes prefer candles to highlight the notion of Hygge more and more, even during the day a table with candles lit joyfully as «we call the candles» (Chowder, 2004).

The Danes keep the same quality of light in the different rooms of the house, the bedrooms, living room or the dining room (Chowder,2004)

Hygge's spatial quality contributes to the development and strengthening of the social bonds of traditional Danish society.

You don't need a special occasion to reach the Hygge, the New York Times' Sophisticated Traveller magazine described the Hygge as the Danish way to fight the darkness of the winter months. (Bille and Sørensen, 2007).

The chimney becomes a source of night light, a soft light that can illuminate the faces of the people seated, the movement of the shadow is preserved.

The Danes keep the light points fixed, they do not seek to move this light point, rather they prefer to move to this point in order to preserve the shadow/lighting contrast.

George De La Tour had expressed this notion of nocturnal intimacy linked to light sources whose faces are partially illuminated, this atmosphere can raise an intimate state of mind that reveals the truth of people. (Danielle Morali, 1994)



Figure44. Georges de La Tour "L'argent versé". Source : <https://lepetitjournal.com/>
Western culture has a specific notion of light which is based on biblical religious teaching, a symbol of life and truth. This vision of light has been embodied in traditional Danish architecture, the Hygee manifests as the sum of all these cultural, religious and social meanings, a contrast that expresses a vision of life.

Summary table

		Medinal habitat Exemple casbah of Algiers	Japanese habitat Exemple machiya Kyoto	Danish habitat Exemple traditional habitat of Aarhus
spatial organization		Rectangular plan with a central patio	A deep longitudinal organization with two gardens	Rectangular plan with a fireplace.
apertures		-Closed Design Door Exterior -door thought open, window and holes of lighting and ventilation overlooking the patio. -window with moucharabieh overlooking the public space.	- shoji as a light-generating element. The boundary between the interior and the microcosm 'garden'. -There is a window overlooking the outside Covered by the sudare. -the front door. -a commercial place overlooking the street.	-the front door. -outward facing windows.
relation to the environment		Introverted to preserve privacy. The 'vestibule' skifa is the transitional space between the public and the private. -the mashrabiyya creates a protected space from the outside while forming a one-way extrovert.	Introverted to mark the hierarchy of spaces as well by the strata and the depth accentuated by the gardens. The microcosm refers to nature, which reminds us of the strong relationship with natural elements. One of the pillars of Japanese philosophy: Wabi Sabi	Extroverti by capturing natural light, we also enjoy the views of the street, a visual continuity. The window is the crucial element that provides natural light from the outside to the habitat. It organizes the different activities close to the outside: space lit by the window
Light	Type	- Natural light.	- Natural light.	-Natural and artificial
	Diffusion	-Direct and indirect.	-direct and transmitted by the translucent shoji.	'chimney' light
	Ambiance	-Light/shadow contrast for the skifa, clarity and purity for the patio, space shaded by the moucharabieh.	-Light/shadow contrast, flexibility and depth, it gives a clean serenity inside machiya.	- Hygge light contrast represents a main criterion of hospitality, we illuminate that some corner of the space and

				we leave the other corners dark.
Symbolic explanation Socio-cultural foundations	Light symbol of clarity guess, the connection between the skies and the earth, the fusion of intimacy and the sacred need for open-sky light made the patio become the heart and source of light and community life, the patio the most illuminated space of the habitat, the clean space that has quite specific ornamentations, the quiet space with feminine domination that can present itself as a world isolated from all outside and specific to these occupants.	Reference to the philosophy of beauty through the shadow. The clear/obscure duality is linked to the concept of sensation and imagination inherent to wabi sabi. The contrast makes the beauty. The living space is empty and flexible to accentuate the depth ‘the sacred path’ to a shoji-filtered light source. The principle of yin and yang is identified by this famous contrast black and white, light and shadow, we mark the light by a dark point in the middle and we mark the dark part by the white point in the middle.	Hygee’s culture of hospitality requires that the light must spread unevenly and erratically over the entire habitable space, the notion of comfort and intimate atmosphere is caused by the soft shadow and light, the biblical reference of the subdued light underlies this specificity, as a symbol of life and reality, the human spirit can project itself in complete freedom and security, the comfort required by the various handicrafts is organized around a window, sitting in front of the chimney whose only spirits have fun and display.	

Table 2 : summary table of study cases. Source: authors.

Conclusion

The concept of light in the built environment, in particular the habitat, and based on the analysis of the three study cases, was projected according to the anchored cultural code specific to each society, According to Lévi-Strauss, this is often 'a relationship between spatial configuration and social structure'; the light specificity is the result of the interaction between the crucial value attributed to the notion of light by different cultures and civilizations and the natural and physical environment.

The dominance guesses illuminates the spaces although the spirits, the clarity of a light on light, the intimacy is preserved by the contrast light/shadow that put the emphasis on this place of transition 'skifa'.

The light/shadow contrast finds another meaning and another utility in the Japanese habitat 'machiya', it refers to the philosophy of beauty of Japanese culture, this contrast sculpts the space, it highlighted the depth of machiya, it indicates the time and succession of seasons, it created a microcosm of meditation. The shoji-filtered light accentuates the shadow projected into the flexible interior space.

In the Danish example is contrary to the medinal example and the Japanese example, the light/shadow contrast is resulting from the extrovert of the architectural plan, the windows bring in soft light that will cause the Hygee, an expression that results from the vision that is supposed to be carried by light and its atmosphere in space.

The architectural conception of housing is only a translation of social, cultural and religious practices into a specific environment. The merging of these factors then creates a community-specific light response.

The medinal habitat comes from a religious culture well linked to the social configuration, the light as a sacred symbol marking the hospitality of Danish society, a comfort underpinned by the image and vision of the relaxing space, a quiet, dark and intimate space that will put the mind in a stage of serene and internal truth.

The same concept of 'light/shadow contrast' has a multitude of objectives that are combined according to the given culture and environment, so we distinguish different theories from the vision of light in traditional architecture, What is common among the different cultures is that this contrast causes a certain sensation that will give an answer to a need specific to a given society. An anthropological reading of light in the built environment will add an heuristic addition to the context this type of research strongly related to the different fields of research, architecture, sociology, philosophy and territorial environment, all will contribute to the understanding of this archi-cultural phenomenon.

The opening mode, the spatial organization, the materials used and the general morphology of the habitat are proposed as variants and control parameters.

This comparative analysis of three study cases confirms that light specificity is part of the psycho-sensory process managed by the socio-cultural code of a given civilization.

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